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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/683,612	10/10/2003	Tzu-En Ho	10112981	1827

34283 7590 02/08/2005

QUINTERO LAW OFFICE
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EXAMINER	
KENNEDY, JENNIFER M	

ART UNIT	PAPER NUMBER
2812	

DATE MAILED: 02/08/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/683,612	HO ET AL.	
	Examiner	Art Unit	
	Jennifer M. Kennedy	2812	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *10 October 2003*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-20* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-20* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 112

The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claims 6 and 16 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 6 recites the limitation "the titanium layer" in lines 1-2. There is insufficient antecedent basis for this limitation in the claim.

Claim 6 recites the limitation "the titanium layer" in lines 1-2. There is insufficient antecedent basis for this limitation in the claim.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 1, 2, 5-12, and 15-20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Youn et al. (U.S. Patent Appl. 2004/0238876) in view of Yang (U.S. Patent Appl. 2002/0074584)

In re claims 1 and 11, Youn et al. disclose the method including the steps of :

forming a polysilicon layer (104) overlying a substrate, insulated from the substrate by a dielectric layer (102);

forming a metal-flash layer (106) overlying the polysilicon layer;

forming a tungsten nitride layer (108) overlying the metal-flash layer; and

forming a tungsten layer (110) overlying the tungsten nitride layer.

Youn et al. disclose the method of annealing the tungsten and the tungsten nitride layer utilizing nitrogen, but do not disclose the method wherein the tungsten and tungsten nitride layer are annealed using nitrogen and hydrogen gases. Yang discloses the method of annealing a tungsten and a tungsten nitride layer of a gate stack using nitrogen and hydrogen gases (see [0072] and [0033]). It would have been obvious to one of ordinary skill in the art at the time the invention was made to anneal the tungsten and tungsten nitride layer of Youn et al. with nitrogen and hydrogen because as Yang discloses the method allows for improved reliability of the transistors (see [0072]).

In re claims 2 and 12, Youn et al. disclose the method further forming a cap layer (114) overlying the tungsten layer.

In re claims 5 and 15, Youn et al. disclose the method of wherein the metal flash layer is formed by self-aligned silicide process (see [0024]-[0025]).

In re claims 6 and 16, it is unclear to the examiner which layer is being referred to in this claim. The examiner believes that Applicant intended on referring to the metal used to form the metal flash layer. Youn et al. disclose the method of forming a metal layer to be about "50 angstroms" (see [0025]), which the examiner considers to be "about 30 Angstroms" as claimed.

In re claims 7 and 17, Youn et al. disclose the method of forming a metal flash layer of a metal silicide, including tungsten silicide, but do not disclose the method wherein the metal flashing layer comprises Ti, Co, or Ni. Yang discloses the method wherein the metal-flash layer comprises Ti, Co, or Ni (see [0033]). It would have been obvious to one of ordinary skill in the art at the time the invention was made to form the metal flashing layer comprising Ti, Co, or Ni rather than the flashing layer comprising W, because as Yang teaches the Ti, Co, and Ni metals are interchangeable with W as refractory metals for a gate stack, all of which allow for lowered resistance.

In re claim 9 and 19, Youn et al. disclose the method wherein the tungsten nitride layer is annealed at 800 to 1000^{o}C (see Youn [0047]).

In re claims 8 and 18, the combined Youn et al. and Yang disclose the method of annealing wherein nitrogen to hydrogen are flowed in at a ratio, of 9:1, but do not disclose the method wherein the flow ratio of nitrogen to hydrogen is about 4:1 to 3:2. The examiner notes that Applicant does not teach that the flow ratio solves any stated problem or is for any particular purpose. Therefore, the flow ratio range lacks criticality in the claimed invention and does not produce unexpected or novel results. Thus, it would have been obvious to one of ordinary skill in the art at the time the invention was made to perform the anneal at the ratio of nitrogen to hydrogen in a range of 4:1 to 3:2, since the invention would perform equally well when different flow ratios are utilized (ie. 9:1) to create a improved reliability of the transistors, and because it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the

optimum or workable ranges involves only routine skill in the art. *In re Aller,* 105 USPQ 233, MPEP 2144.05 II A.

In re claims 10 and 20, the combined Youn et al. and Yang disclose the method of annealing including annealing for less than 40 minutes (see [0047]), but do not explicitly disclose the method wherein the annealing is form 50 to 100 seconds. The examiner notes that Applicant does not teach that the length of time of anneal solves any stated problem or is for any particular purpose. Therefore, the length of time of anneal lacks criticality in the claimed invention and does not produce unexpected or novel results. Thus, it would have been obvious to one of ordinary skill in the art at the time the invention was made to perform the anneal for 50 to 100 seconds, since it would allow reduction in time of formation of the device, thus increasing throughput and because it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art. *In re Aller,* 105 USPQ 233, MPEP 2144.05 II A.

Claims 3-4, and 13-14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Youn et al. (U.S. Patent Appl. 2004/0238876) and Yang (U.S. Patent Appl. 2002/0074584) in view of Cantell et al. (U.S. Patent No. 6,255,179).

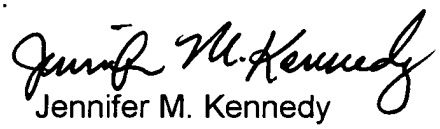
The combined Youn et al. and Yang disclose the method as claimed and rejected above, but do not disclose the method of cleaning the surface of the polysilicon with a dilute HF acid. Cantell et al. disclose the method of cleaning the surface of the polysilicon with a dilute HF acid prior to the formation of a silicide layer (see column 4,

lines 41-55). It would have been obvious to one of ordinary skill in the art at the time the invention was made to cleaning the surface of the polysilicon with a dilute HF acid prior to the formation of a silicide layer because it allows for the removal of contaminates.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jennifer M. Kennedy whose telephone number is (571) 272-1672. The examiner can normally be reached on Mon.-Fri. 9:30-6:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Michael S. Lebentritt can be reached on (571) 272-1873. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



Jennifer M. Kennedy
Patent Examiner
Art Unit 2812

jmk